Remarks

Claims 84-89 are pending in the Application.

Claims 87-89 stand rejected.

Claim 84-86 stand allowed.

I. REJECTIONS UNDER 35 U.S.C. § 102

Examiner has rejected Claims 87-89 under 35 U.S.C. § 102(a) as being anticipated by Kiang *et al.*, "Carbon Nanotubes with Single-Layer Walls," Carbon, 33(7), pp. 903-914, 1995 ("*Kiang*"). Paper No. 10, at 2-3. When doing so, the Examiner has relied upon Zhang *et al.*, "Microscopic structure of as-grown single-wall carbon nanotubes by laser ablation," Philosophical Magazine Letters, 78(2), pp. 139-144, 1998 ("*Zhang*") purportedly to show a "state of fact."[1] *Id.*

Claims 87-88. Regarding Claims 87-88, Examiner contends that, because *Kiang* teaches that single-walled nanotubes tend to aggregate into bundles, the nanotubes within said bundle running substantially parallel to one another, and because "Zhang teaches that the tubes have a homogeneous diameter and are packed into a two-dimensional triangular lattice,... it is inherent to the bundled single-walled nanotubes [of *Kiang*] that they have a homogeneous diameter." Paper No. 9, at 2.

Anticipation requires each and every claim to be found within the cited prior art reference. Claim 87 requires the composite array be formed from a process comprising "assembling the single-wall carbon nanotubes into at least two substantially two-dimensional arrays, wherein each of the two-dimensional arrays comprise the single-wall carbon nanotubes aggregated in substantially parallel orientation" and "assembling the two-dimensional arrays into a single composite array." *Kiang* does not teach a composite array that would result from such a process, nor is such a composition inherent in the nanotube bundles disclosed in *Kiang*.

The composite array of Claim 87 is a composite assembly of at least two arrays that are substantially two-dimensional. One embodiment of a substantially two-dimensional array is

[1] There are only three instances under which a second reference can be used when making a §102 rejection. *See* M.P.E.P § 2131.01. The only one possibly pertinent here is the third instance, namely to "[s]how that a characteristic not disclosed in the reference is inherent." *Id.*

described in the Application, p. 38 *ll.* 25-30, [This] "substantially two-dimensional array is made up of single-walled nanotubes aggregating (e.g., by van der Waals forces) in substantially parallel orientation to form a monolayer extending in directions substantially perpendicular to the orientation of the individual nanotubes." and p. 39 *ll.* 1-5, "Such a molecular array is illustrated schematically in **Fig. 8**." Fig. 8 shows nanotubes with short lengths perpendicular to a two-dimensional plane. In contrast, *Kiang* describes bundles of nanotubes having the shape of ropes, rather than substantially two-dimensional arrays or planes. These bundles would not be recognized by persons of ordinary skill in the art as two-dimensional arrays or as assemblies of two-dimensional arrays. Therefore, the assertion that there is no difference between the bundles of *Kiang* and the claimed composite array of Claim 87 is misplaced.

Moreover, the argument that the *Kiang* bundled single-walled nanotubes are inherently packed in such two-dimensional triangular lattice, as well as the argument (directed to Claims 88 and 89) that these single-wall carbon nanotubes inherently have a homogeneous diameter, based on *Zhang* (a non-prior art reference),[2] are further incorrect. For inherency to be shown, extrinsic evidence must be presented that makes "clear that the missing descriptive matter is necessarily present in the thing described in the reference, and that it would be so recognized by persons of ordinary skill." *Continental Can Co. v. Monsanto Co.*, 948 F.2d 1264, 1268, 20 U.S.P.Q.2d 1746, 1749 (Fed. Cir. 1991). Inherency cannot be established by probabilities or possibilities. The mere fact that a certain thing may result from a given set of circumstances is legally insufficient. *Id.,* 948 F.2d at 1269, 20 U.S.P.Q.2d at 1749. This is an important distinction given that the single-wall carbon nanotubes of *Kiang* and *Zhang* are made by processes that, not only differ substantially from each other, but also from the processes employed to make the single-wall carbon nanotubes of the present invention. Furthermore, the diameter distribution of single-wall carbon nanotubes is highly dependent on the synthesis process. For example, a distribution of diameters of single-wall carbon nanotubes, which are in ropes (or bundles) and also made by

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[2] *Zhang* was published in the Philosophical Magazine Letters in 1998. The present Application is a division of co-pending prior application Serial No. 10/000,746, filed on November 30, 2001, which is a continuation of prior application Serial No. 09/242,040 filed on September 13, 1999, which is the 35 U.S.C. § 371 national application of International Application Number PCT/US97/13896 filed on August 8, 1997, which designated the United States, claiming priority to provisional U.S. patent application Serial Number 60/023,732 filed on August 8, 1996. Thus, putting aside any benefits this Application receives due to its provisional application, this Application has at least an effective filing date of August 8, 1997. Accordingly, *Zhang* is not prior art.

laser evaporation of metal-doped graphite, which is the same process as the present invention, is shown in Nikolaev *et al.*, "Diameter doubling of single-wall nanotubes," Chemical Physics Letters, 266 (5-6), pp. 422-426, 1997, Fig. 2 (Exhibit A). Accordingly, Examiner's assertion of inherency that the bundled single-walled nanotubes of *Kiang* are packed in two-dimensional triangular lattices and have a homogeneous diameter is without basis.

Claim 88 depends from Claim 87, therefore, Claim 88 is also not anticipated for the same reasons as stated above for Claim 87. In addition, Claim 88 requires "the two-dimensional arrays comprise single-wall carbon nanotubes having a homogeneous characteristic selected from the group consisting of lengths, diameters, helicities and combinations thereof." *Kiang* does not include the required limitation of any homogeneous characteristic stated above. Examiner's argument (Paper No. 9, at 2) that single-wall carbon nanotubes have inherently homogeneous diameters when aggregated in bundles is misplaced for reasons stated above.

Claim 89. Regarding Claim 89, Examiner contends that "it is not explicitly taught that the individual single-wall nanotubes in a bundle have homogenous lengths or helicities in any given region of the bundle. However, it is expected that at least two adjacent tubes will have the same helicity or the same length due to corresponding growth conditions. Thus, it is expected that a region of a nanotube bundle have a homogeneous length or helicity in addition to the homogeneous diameter, which property is shared by the entire bundle." Paper No. 9, at 3.

Claim 89 depends from Claim 87, therefore Claim 89 is also not anticipated for the same reasons as stated above for Claim 87. Also, for reasons stated above, the assertion of inherent homogeneity of diameter of *Kiang* nanotubes is without basis. Moreover, the speculation or expectation that single-wall carbon nanotubes within a rope would have homogeneous lengths and/or helicities is also without support. *Kiang* does not address lengths or helicities; and, Applicants note, *Zhang* does not either. It cannot follow that such features are necessarily present; and thus such features are not inherent in *Kiang*. *See Continental* 948 F.2d at 1269, 20 U.S.P.Q.2d at 1749.

As a result of the foregoing, Applicants respectfully request that the Examiner withdraw the rejection of Claims 87-89 under 35 U.S.C. § 102(a) as being anticipated by *Kiang*.

II. REJECTIONS UNDER 35 U.S.C. § 103

Examiner has rejected Claim 89 under 35 U.S.C. § 103(a) as being obvious over *Kiang* with *Zhang*. Paper No. 9, at 3.

As a preliminary point pertaining to this § 103(a) rejection, it is unclear to Applicants whether the Examiner is combining the two references when making this rejection or the Examiner is relying only *Kiang* for this obviousness rejection and is utilizing *Zhang* merely to show that *Kiang* inherently has certain features.

To the extent the Examiner is asserting the former, Applicants respectfully point out that *Zhang* is not a prior art reference, as it was published after the effective filing date of the Application. *See* footnote 2 above. Thus, there is no basis for this § 103(a) rejection.

To the extent the Examiner is asserting the latter, Examiner is reminded that:

> To establish a *prima facie* case of obviousness, three basic criteria must be met. First, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine reference teachings. Second, there must be a reasonable expectation of success. Finally, the prior art reference (or references when combined) must teach or suggest all the claim limitations. The teaching or suggestion to make the claimed combination and the reasonable expectation of success must both be found in the prior art and not based on applicant's disclosure.

See M.P.E.P. 706.02(j); *see also In re Vaeck,* 947 F.2d 488, 20 U.S.P.Q.2d 1438 (Fed. Cir. 1991).

With regard to Claim 89, Applicants respectfully point out that *Kiang* teaches or suggests none of the homogeneous characteristics of length, diameter, or helicity, as limitations put forth in Claim 89. As noted above, there is no teaching or suggestion (inherent or otherwise) in *Kiang* to overcome this void.

As a result of the foregoing, Applicants respectfully request that the Examiner withdraw the rejection of Claims 89 under 35 U.S.C. § 103(a) as being obvious over *Kiang* with (or without) *Zhang*.

III. AMENDMENTS TO THE DRAWINGS

The present application and United States Patent Application Serial No. 10/027,568, filed December 21, 2001 ("the '568 Patent Application") are both divisional patent applications of the United States Patent Application Serial No. 10/000,746, filed November 30, 2001, all of which applications are commonly assigned. On October 7, 2002, a Notice of Allowance was

transmitted to Applicants for the '568 Patent Application; and Applicants paid the issue fee on October 16, 2002. Subsequently, on March 20, 2003, Applicants received a Notice Regarding Drawings for the '568 Patent Application. Specifically, the Draftperson's review objected to the drawings for Figures 2A-C, 4A-D, 6, and 7A-B for the following reasons set forth on PTO Form 948, which was attached to the Notice Regarding Drawings for the '568 Patent Application. These were:

(a) Under 37 C.F.R. § 1.84(i), for Figures 2A-C, 4A-D, 6, and 7A-B, "[l]ines, numbers & letters not uniformly thick and well defined, clean, durable, and black (poor line quality)."

(b) Under 37 C.F.R. § 1.84(m), for Figures 2A-C, 4A-D, 6, and 7A-B, "[s]olid black shading not permitted."

(c) 37 C.F.R. § 1.84(p), for Figures 4A-D, 6, and 7A-B, "[n]umbers and reference characters not plain and legible."

On May 19, 2003, Applicants filed their Response to Notice Regarding Drawings in the '568 Patent Application. In this response, Applicants replaced new drawing sheets 3/14, 6/14, 8/14, 9/14 and 10/14 for the original sheets. These sheets include more legible Figures 2A- 2C, 4A- 4D and 6 – 7B as requested by the Draftsperson. in the Notice Regarding Drawings for the '568 Patent Application.

As the present Application contains these same drawings, Applicants are submitting these improved figures in the present Application. Pursuant to 37 C.F.R. 1.84(b), the improved figures are submitted as photographs, as this is the only practicable medium for illustrating these figures.

Applicants have amended the drawings to facilitate prosecution of the present Application; Applicants believe by doing so, this will obviate this potential issue with the figures.

IV. AMENDMENTS TO THE SPECIFICATION

After Applicants filed their Response to Notice Regarding Drawings in the '568 Patent Application, Applicants received a Notice of Drawing Inconsistency with Specification in the '568 Patent Application, dated June 2, 2003. In this Notice, Applicants were informed that the USPTO had received the improved figures (which presumably were accepted by the draftsperson) but the USPTO had now identified an inconsistency between the drawings and the

Brief Description of Drawings in the '568 Patent Application. These were: The Brief Description referred to Figures 3A-3B and 5A-5B while the drawings contained Figures 3A-3C and 5A-5C. On June 30, 2003, Applicants filed their Amendment in Response to Notice of Drawing Inconsistency with Specification in the '568 Patent Application. In that amendment, Applicants amended the Brief Description of Drawings and the Detailed Description of the Invention, in the identical manner as presented on page 2 above.

Because this same issue exists in the present Application, Applicants are amending the specification in the same manner as they did in the '568 Patent Application. Accordingly, in the specification, the paragraphs within the Brief Description of Drawings have been amended to correctly identify the drawings. In the Detailed Description of the Invention of the Specification, the amendment of the paragraph beginning at page 18, *l.* 11, was made to harmonize the written description and the drawings. No new matter is added by these amendments to the specification.

The Applicants believe this amendment reconciles the inconsistency between the drawing and the Brief Description of the Drawing. Again, Applicants are amending the specification to facilitate prosecution of the present Application. Applicants believe by doing so, this will obviate this potential issue between the drawings and the specification.

V. CONCLUSION

As a result of the foregoing, it is asserted by Applicants that the Claims in the Application are now in a condition for allowance, and respectfully request allowance of such Claims.

Applicants respectfully request that the Examiner call Applicants' attorney at the below listed number if the Examiner believes that such a discussion would be helpful in resolving any remaining problems.

Respectfully submitted,

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